

**THE
CORONAVIRUS
RECOVERY
HANDBOOK**

**19 REHAB
EXERCISES**
**FOR MILD TO SEVERE CASES OF
COVID-19**

Liu Xiaodan, MD, and Shan Chunlei



SKYHORSE PUBLISHING

VISIT...

LANZAROTE
Caliente.com

THE CORONAVIRUS RECOVERY HANDBOOK



19 REHAB EXERCISES FOR MILD TO SEVERE CASES OF COVID-19

Liu Xiaodan, MD

Vice Dean of the School of Rehabilitation Science of Shanghai University

Shan Chunlei

Visiting Scholar of Harvard Medical School in the United States

THE CORONAVIRUS RECOVERY HANDBOOK



19 REHAB EXERCISES FOR MILD TO SEVERE CASES OF COVID-19

Liu Xiaodan, MD

Vice Dean of the School of Rehabilitation Science of Shanghai University

Shan Chunlei

Visiting Scholar of Harvard Medical School in the United States

**THE
CORONAVIRUS
RECOVERY
HANDBOOK**

**19 REHAB
EXERCISES**
**FOR MILD TO SEVERE CASES OF
COVID-19**

Liu Xiaodan, MD, and Shan Chunlei



SKYHORSE PUBLISHING

Copyright © 2020 by Central South University Press
Originally published by Central South University Press, Hunan, China.
The world translation rights are exclusively represented by Rightol Media.
(copyright@rightol.com)

All rights reserved. No part of this book may be reproduced in any manner without the express written consent of the publisher, except in the case of brief excerpts in critical reviews or articles. All inquiries should be addressed to Skyhorse Publishing, 307 West 36th Street, 11th Floor, New York, NY 10018.

Skyhorse Publishing books may be purchased in bulk at special discounts for sales promotion, corporate gifts, fund-raising, or educational purposes. Special editions can also be created to specifications. For details, contact the Special Sales Department, Skyhorse Publishing, 307 West 36th Street, 11th Floor, New York, NY 10018 or info@skyhorsepublishing.com.

Skyhorse® and Skyhorse Publishing® are registered trademarks of Skyhorse Publishing, Inc.®, a Delaware corporation.

Visit our website at www.skyhorsepublishing.com.

10 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data is available on file.

Cover design by Brian Peterson
Cover images courtesy of Central South University Press

Print ISBN: 978-1-5107-6307-4
Ebook ISBN: 978-1-5107-6310-4

Printed in the United States of America

Table of Contents

About the Authors

About the Book

Preface One

Preface Two

Part 1: Instruction on Rehabilitation Training with Integrated Traditional Chinese and Western Medicine for COVID-19 Patients during Recovery

Chapter 1: Background of COVID-19 and Significance of Pulmonary Rehabilitation Intervention

Chapter 2: Contents and Effects of Pulmonary Rehabilitation

Chapter 3: Design Concepts and Effects of Pulmonary-Based Qigong Rehabilitation Protocol (PQRP)

Part 2: Rehabilitation Training Program for Patients with Mild COVID-19 Symptoms during Recovery

Chapter 1: Objective

Chapter 2: Principles

Chapter 3: Protocols—Pulmonary-Based Qigong Rehabilitation Protocol

Part 3: Bed-Based Rehabilitation Training Program for Patients with Severe COVID-19 Symptoms during Recovery

Chapter 1: Objective

Chapter 2: Principles

Chapter 3: Protocols

Chapter 3.1: Pulmonary Rehabilitation Training in Supine Position

Chapter 3.2: Pulmonary Rehabilitation Training in Sitting Position

About the Authors

Liu Xiaodan, MD, is associate professor, master supervisor, rehabilitation therapist, and vice dean of the School of Rehabilitation Science of Shanghai University of Traditional Chinese Medicine; the chairman of the Occupational Therapy Youth Committee of the Chinese Rehabilitation Medical Association; and vice chairman of the External Treatment Committee of the Shanghai Society of Traditional Chinese Medicine.

In recent years, Liu Xiaodan has been engaged in clinical research on lung rehabilitation for chronic respiratory diseases. During the past five years, she has been mainly responsible for more than ten projects at all levels, including for the National Nature Foundation, and has published more than thirty papers, including ten Science Citation Index (SCI) papers.

The pulmonary-based Qigong rehabilitation protocol (PQRP), which was created by Liu Xiaodan, has recently been featured widely on [People.cn](#), Xinhuanet, the China Health Qigong Association Network, [Xuexi.cn](#), the official website of the General Administration of Sport of China, Tencent, NetEase, and other platforms and media and has obtained much public recognition.

Shan Chunlei is a professor, chief physician, doctoral/postdoctoral supervisor, doctor of the Chinese Academy of Sciences, and a visiting scholar of Harvard Medical School in the United States.

He is dean of Rehabilitation Science, School of Shanghai University of Traditional Chinese Medicine; director of the Rehabilitation Medicine Institute of Shanghai University of Traditional Chinese Medicine; and director of the Rehabilitation Medicine Center of Yueyang Hospital of Integrated Traditional Chinese and Western Medicine, Shanghai University of Traditional Chinese Medicine.

In Shanghai, Shan Chunlei has been recognized as an outstanding academic leader and a leading talent in clinical rehabilitation.

He served as chairman of the traditional Supplementary Integrated

Rehabilitation Committee of the Asia-Oceanian Society for NeuroRehabilitation and chairman of the Brain Function Testing and Regulation Rehabilitation Committee of the Chinese Association of Rehabilitation Medicine.

He is a peer reviewer for the second review of the National Natural Science Foundation of China project. He is mainly engaged in clinical and scientific research in rehabilitation medicine using integrated traditional Chinese and Western medicine. He has won the excellent Young and Middle-aged Expert Award for Stroke Prevention and Treatment from the National Health Commission of the People's Republic of China, the Outstanding Rehabilitation Physicians Award, and first prize in the Science and Technology Award from the Chinese Association of Rehabilitation Medicine.

He is in charge of one national key research and development program project and three National Natural Science Foundation projects. He has published more than 120 academic papers, including fifty SCI papers. He has edited and participated in the compilation of thirty monographs and textbooks.

About the Book

Recently, coronavirus (COVID-19) has become widespread, and many countries worldwide are experiencing the pandemic.

In response to the call for international and regional cooperation in the fight against the pandemic, for sharing our experience of epidemic prevention and control with relevant countries, and for joint management of the pandemic, which was proposed by the Central Committee of the Communist Party of China, we wanted to publish an English version of the book *The Coronavirus Recovery Handbook*, to reflect China's determination and commitment to building a community with a shared future for humankind.

This book was compiled by the rehabilitation medicine team of Shanghai University of Traditional Chinese Medicine. It was based on the team's previous clinical and scientific research work, combined with relevant national diagnosis and treatment guidance and the clinical experience of many experts involved in the fight against this pandemic. To address the clinical needs of patients with mild and severe COVID-19, this book presents a series of integrated traditional Chinese and Western medicine lung rehabilitation training methods, which have been used in the Shanghai Public Health Clinical Center (affiliated to Fudan University) and Lei Shenshan Hospital in Wuhan.

In particular, it is worth mentioning that the pulmonary-based Qigong rehabilitation protocol (PQRP) introduced in the book has a good rehabilitative effect on patients with mild COVID-19 symptoms or with chronic respiratory diseases. After practice, some patients reported that they experienced "smooth breathing, comfortable muscles" and that they felt "refreshed and relaxed." This set of exercises scientifically integrates the action of regulating lung and breathing functions in the traditional Chinese exercises of Liuzijue, Wuqinxi, Baduanjin, and Yijinjing Qigong. Therefore, these exercises are both scientific and comprehensive. They are also simple and easy to implement. This exercise system is not only based on the ancient theory of traditional Chinese medicine, but also has been tested in

modern clinical medicine.

To make it easier for readers to practice by themselves, the book is accompanied by an excellent teaching demonstration video, which is linked to the book with a QR code.

Preface One

In 2020, a novel coronavirus pneumonia (named coronavirus disease 2019, or COVID-19) spread around the world, resulting in serious harm to human lives. Under the strong leadership of President Xi Jinping, the Chinese government is engaged in a vigorous effort to combat the sudden outbreak of this novel virus. A nationwide battle against what is now a pandemic has been initiated, and 1.4 billion Chinese people are united in fighting this “war without smoke.” At present, the prevention and control of the pandemic is in a critical period; the situation remains severe but is stable and improving.

Patients with COVID-19 often first show respiratory symptoms and have varying degrees of impaired respiratory function. Patients with severe COVID-19 symptoms show dyspnea and hypoxemia, which can develop into acute respiratory distress syndrome with multiple organ failures and dysfunction. For patients with mild or severe COVID-19 symptoms, if treatment is prolonged and the period of physical inactivity is lengthy, complications tend to occur (including pressure ulcers, venous thrombosis, orthostatic hypotension, muscle atrophy, and osteoporosis), and recovery of respiration, circulation, and systemic functions is difficult. Therefore, appropriate and moderate rehabilitation interventions for patients with mild and stable COVID-19 symptoms in the recovery stage will help to prevent complications, promote recovery of cardiopulmonary function and physical fitness, and relieve anxiety and panic. In the current situation, saving lives and preventing the resurgence of the disease remain the top priorities, but rehabilitation can still make a difference and can be initiated before the recovery period. Rehabilitation can be initiated early without affecting the treatment for patients. For example, in the early stage, patients can move their limbs to prevent damage to joint functions, perform sputum-discharging exercises in a variety of positions (including prone position, healthy lateral position, and tapping and rubbing the back), and perform breath training exercises. In the recovery period, patients could practice the PQRP introduced in this

book, which helps to improve respiratory function.

China has adopted disease prevention as the main policy for implementing the “Healthy China Strategy.” Physical fitness is one of the main aspects of rehabilitation, and patients are encouraged to participate in exercise at different levels of intensity. Rehabilitation can not only enhance cardiopulmonary and metabolic function, but also prevent many diseases through analysis of big data. Hence, rehabilitation has gradually received more attention as a valuable aspect of health care and an important way of promoting health. Rehabilitation can be appropriate for all populations (from infants and young children to older people, healthy or sick) and can produce benefits in many situations. However, rehabilitation must be tailored to the individual using scientific methods.

The rehabilitation team of Shanghai University of Traditional Chinese Medicine compiled this book by drawing on previous clinical and scientific research work, combined with the relevant national diagnosis and treatment guidance and the experience of many experts on the frontline of the pandemic. The series of pulmonary rehabilitation training methods proposed in this book are simple and easy to implement and meet the clinical practical needs of patients with COVID-19. It is believed that the publication of this book will help medical colleagues on the frontline of COVID-19 care to provide patient-oriented guidance and promote the early recovery of patients.

The most important thing in rehabilitation is persistence! It is hoped that patients with COVID-19 will gradually develop active exercise practices on the basis of ensuring their own safety, to strengthen their physical fitness, strive for an early recovery, and join the fight against COVID-19.

It has been a pleasure to write this preface with these hopes in mind.

—Zhou Shifang, Nanjing, March 2020

Preface Two

In 2020, a novel coronavirus pneumonia (named coronavirus disease 2019, or COVID-19) spread around the world. The virus poses a huge threat to human life and safety and has become a public health emergency of international concern. Faced with the sudden outbreak of this novel virus, the Party Central Committee made it an important priority, and President Xi Jinping personally led and deployed the prevention and containment efforts, declaring an all-out war on the epidemic. The National Health Commission of China actively responded and organized medical experts to carry out COVID-19 diagnosis and treatment, so that the epidemic situation was effectively controlled in a short time.

With the deepening of knowledge about COVID-19 and the accumulation of diagnosis and treatment experience, the cure rate of COVID-19 patients is gradually improving. An important research focus for medical workers is the prognosis of patients during recovery and helping patients to participate in rehabilitation training. According to current diagnosis and treatment results, most patients affected by the disease experience prolonged inactivity, which leads to impaired respiratory function, exercise capacity, quality of life, and negative mood (anxiety and depression). Therefore, it is necessary that we guide patients with stable COVID-19 symptoms to engage in pulmonary rehabilitation exercises for promoting the recovery of pulmonary function and improving prognosis. Drawing on previous clinical and scientific research work, the rehabilitation team of Shanghai University of Traditional Chinese Medicine compiled the book *The Coronavirus Recovery Handbook* according to the pathogenesis, clinical manifestations, and prognosis of COVID-19. This book proposes a series of integrated traditional Chinese and Western medicine pulmonary rehabilitation training methods for patients with mild and severe COVID-19 symptoms. The PQRP compiled by Liu Xiaodan's rehabilitation team integrates the core elements of rehabilitation for lung and breathing from several classical

traditional Chinese exercises including Liuzijue, Wuqinxi, Baduanjin, and Yijinjing Qigong. This set of exercises is both scientific and universal and is simple and easy to implement. The PQRP was proposed according to the basic theory of traditional Chinese medicine, and its effectiveness has been proven in modern clinical practice. During the COVID-19 outbreak, the PQRP was widely featured in the media, including [Xuexi.cn](#), [People.cn](#), Xinhuanet, the official website of the General Administration of Sport of China, the China Health Qigong Association Network, Tencent, NetEase, and local media across the country and has obtained public recognition and approval.

The PQRP compiled in this book shows the following three features. First, the timing of rehabilitation interventions for COVID-19 is the clear recovery period. Second, the intervention method is reliable. It integrates the core elements of lung rehabilitation from modern pulmonary rehabilitation and traditional Chinese exercises, and it is based on scientific literature. Third, the exercise goals are clear: to improve patients' quality of life and help them return to society as soon as possible.

It is hoped that the publication of this book will not only help COVID-19 patients to develop active exercise practices on the basis of ensuring their own safety, but will also benefit medical colleagues on the frontline of this pandemic.

—Yan Juntao, Shanghai, March 2020

**THE
CORONAVIRUS
RECOVERY
HANDBOOK**

Part 1:

Instruction on Rehabilitation Training with Integrated Traditional Chinese and Western Medicine for COVID-19 Patients during Recovery

This instruction is based on a series of diagnosis and treatment programs for novel coronavirus pneumonia (named coronavirus disease 2019, or COVID-19) and on the “Rehabilitation Program for Discharged Patients with COVID-19 (Trial)” issued by the National Health Commission of the People’s Republic of China and is guided by frontline medical experts. It integrates traditional Chinese exercise fitness methods that nourish the lungs and modern pulmonary rehabilitation exercises and provides a set of effective methods of pulmonary rehabilitation exercise for patients with COVID-19 to practice during recovery.

1 Background of COVID-19 and Significance of Pulmonary Rehabilitation Intervention

In 2020, a novel coronavirus pneumonia (named coronavirus disease 2019, or COVID-19) spread around the world, resulting in serious harm to human lives. Prolonged bed rest or lack of activity not only renders COVID-19 patients prone to complications such as venous thrombosis, pressure ulcers, orthostatic hypotension, muscle atrophy, and osteoporosis, but also has a negative effect on the recovery of breathing, circulation, and systemic function. Hence, for COVID-19 patients with mild to severe symptoms during recovery, appropriate and moderate rehabilitation interventions will help to prevent

complications, promote recovery of cardiopulmonary function and physical fitness, and reduce negative emotions like anxiety.

2 Contents and Effects of Pulmonary Rehabilitation

As an important nonpharmacological treatment for respiratory diseases, pulmonary rehabilitation is increasingly used in clinical practice. Its main features include exercise training (such as breathing training, aerobic training, and resistance training), health education, and self-management. Of these, exercise training is a core element and one of the most effective rehabilitation methods for respiratory diseases. A large number of clinical and basic studies have shown that exercise-based pulmonary rehabilitation training can improve pulmonary function, decrease airway resistance, enhance immune function, and increase exercise capacity, thus improving the physical activity and quality of life of patients with respiratory diseases.

3 Design Concepts and Effects of Pulmonary-Based Qigong Rehabilitation Protocol (PQRP)

Traditional Chinese exercise is a low-to-moderate intensity holistic exercise that regulates the heart, breath, and morphology, with no restrictions of time, space, and place. Previous studies have found that traditional Chinese exercises (such as Tai Chi, Liuzijue, Wuqinxi, Baduanjin, and Yijinjing Qigong) have positive effects on the recovery from respiratory diseases by regulating the mind, breath, body posture, and limb movements.

Previous clinical trials identified two distinct features of PQRP:

First, an obvious target. This protocol was proposed to target respiratory disease. It integrates movements associated with rehabilitation for lung and breathing from several classical traditional Chinese exercises.

Second, obvious effects. Previous research results indicate that persistence in practicing PQRP is effective in improving chronic respiratory diseases; enhancing patients' pulmonary function, exercise capacity, and quality of life; and relieving anxiety and depression.

To effectively improve patients' respiratory function, physical function, psychological function, and ability to participate in daily and

social activities, the rehabilitation team of Shanghai University of Traditional Chinese Medicine proposed this integrated traditional Chinese and Western medicine rehabilitation training protocol. This protocol was developed based on a series of COVID-19 diagnosis and treatment programs, the “Rehabilitation Program for Discharged Patients with COVID-19 (Trial)” issued by the National Health Commission of the People’s Republic of China, and guidance from frontline medical experts. The objective is to provide a set of effective pulmonary rehabilitation exercise methods for patients with COVID-19 to practice during recovery.

Training effects:

To improve the immune system, pulmonary function, exercise capacity, quality of life, and psychological function of patients with respiratory diseases, and to promote recovery from disease.

Clinical effects:

There is evidence for positive training effects, including improvement in pulmonary function; alleviation of dyspnea and cough; and reduction of fatigue, anxiety, and insomnia in patients with mild COVID-19 symptoms during recovery. Some patients have reported that after training that they experienced “smooth breathing” and felt “comfortable, refreshed, and relaxed.”

Part 2:

Rehabilitation Training Program for Patients with Mild COVID-19 Symptoms during Recovery

The PQRP exercise program was developed according to the physical conditions of patients with mild COVID-19 symptoms during recovery. The PQRP draws on the basic theory of traditional Chinese medicine and integrates the core elements of rehabilitation for lung and breathing from several classical traditional Chinese exercises. These can be used to improve the immune system, pulmonary function, exercise capacity, and quality of life, and to alleviate negative mood.

1 Objective

For patients with mild COVID-19 symptoms who are not bedridden and can already walk around, this rehabilitation training program guides them to perform PQRP training indoors to reduce the complications induced by prolonged bed rest, and to improve cardiopulmonary, physical, and psychological function, thus promoting recovery and a return to normal life.

2 Principles

Safety first: It is not recommended for patients at risk of falling. The first training session should be supervised by medical staff, and attention should be paid to patients' subjective feelings (fatigue) during and after training, as well as their heart rate, blood pressure, blood oxygen saturation, and other indexes.

Breathe naturally: Breathe naturally during training; do not breathe hesitantly or hold the breath.

Step by step: The amplitude, frequency, and timing of breathing and physical activity can be gradually increased step by step according

to individual needs.

Timely termination: If there is any discomfort (such as cough, chest tightness, headache, dizziness, or joint pain), training should be terminated promptly.

Personalized training: Tailor the training according to each patient's condition.

3 Protocols

Pulmonary-Based Qigong Rehabilitation Protocol

The PQRP draws on the basic theory of traditional Chinese medicine and integrates core elements of respiratory disease rehabilitation from several traditional Chinese exercises, including Liuzijue, Wuqinxi, Baduanjin, and Yijinjing Qigong. Previous research results indicate that persistence in practicing PQRP is effective in improving chronic respiratory diseases; enhancing patients' pulmonary function, exercise capacity, and quality of life; and relieving anxiety and depression.¹ During the COVID-19 pandemic, PQRP has been applied and proved to be effective in improving pulmonary function, dyspnea, cough, fatigue, anxiety, insomnia, and sleep quality. The main characteristics of PQRP are the rise-up position, “HU” zijue, “SI” zijue, pushing up the sky to regulate the triple warmer (internal organs), drawing a bow to shoot a vulture, the crane exercise, cross-armed iron staff, and restore position.

Notes: It is recommended to perform PQRP training twice a day if you have the physical ability to do so. If there is no discomfort, and physical fitness and clinical indicators show improvement, it is recommended to continue the training. The recommended exercise intensity of the PQRP is 11–12 on the Borg scale (that is, patients feel mild exertion or mild fatigue), according to patients' subjective feelings.

	Borg Scale	Scale for rating of perceived exertion
Scale for rating of subjective fatigue	6	Very, very light
	7	
	8	
	9	Very light
	10	
	11	Fairly light
	12	
	13	Somewhat hard
	14	
	15	Hard
	16	
	17	Very hard
	18	
	19	Very, very hard
	20	

The Borg Scale for Rating Perceived Exertion

PREPATORY POSITION

Movement instruction: Stand naturally, with feet shoulder-width apart; keep head, neck, and back straight, arms hanging naturally at the sides of body; eyes closed slightly; smile, relax, and breathe naturally.



Movement: Drop hands and separate feet.

Breathing: Inhale through the nose and exhale slowly.

FIRST: RISE-UP POSITION

Movement instruction: Bend elbows, turn forearms so that your palms are facing upward and your fingertips are pointing toward each other, lift palms slowly to chest level, and inhale through the nose. Flip forearms downward and press palms down slowly to the navel. Bend knees to squat and turn palms outward, then move forward slowly until arms are rounded, exhaling through pursed lips. Turn palms inward, stand up, and slowly retract arms to the navel, inhaling through the nose. Cross the palms and clasp hands together for a while, keep eyes closed slightly, and breathe naturally.

Effects: Relax the body and mind, promote the circulation of Qi and blood, promote concentration, nourish Qi and calm the mind, eliminate fatigue and anxiety.



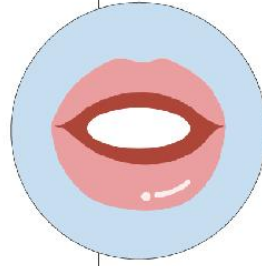
Movement: Stand up with feet apart.

Breathing: Inhale through the nose and exhale slowly.



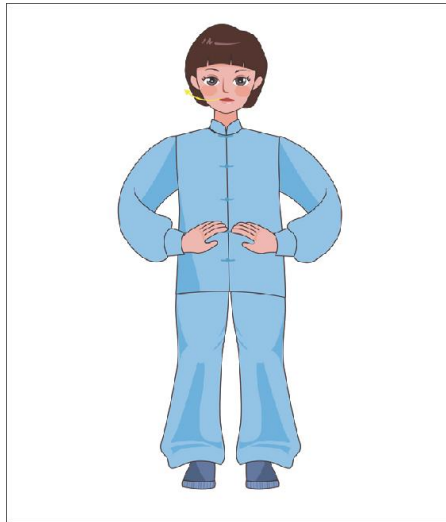
Movement: Lift palms slowly to chest level.

Breathing: Inhale through the nose.



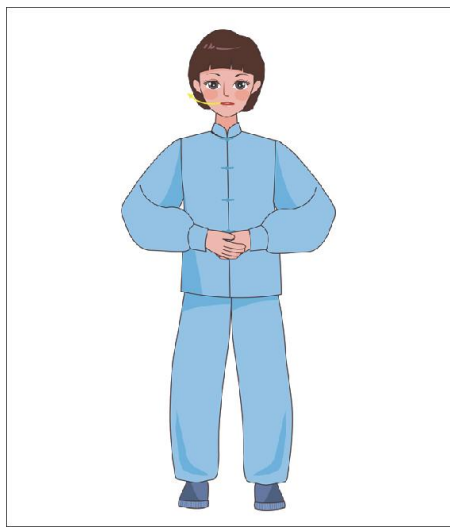
Movement: Press palms down slowly to the navel, bending knees to squat.

Breathing: Exhale through pursed lips.



Movement: Bend knees to squat and turn palms outward, then move hands forward slowly until arms are rounded.

Breathing: Exhale through pursed lips.



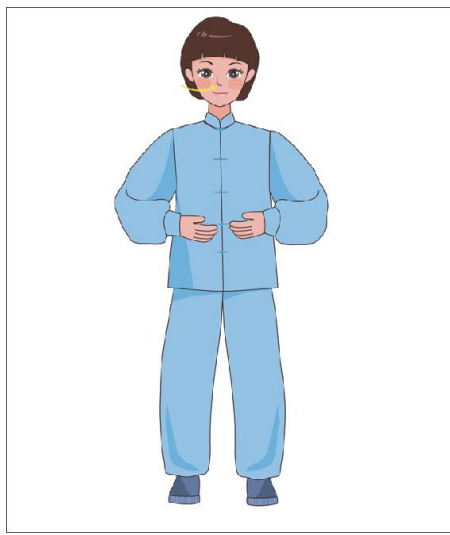
Movement: Stand up, slowly retracting hands.

Breathing: Inhale through the nose.

SECOND: “HU” ZIJUE

Movement instruction: Bend knees slightly, open hands until arms are rounded away from the body, and exhale while pronouncing “HU.” Then stand up, retracting the hands, and inhaling through the nose. Take a break and then repeat the exercise six times.

Effects: Traditional Chinese medicine claims that the “HU” sound corresponds to the spleen. Hence, pronouncing “HU” has the effect of releasing turbid gas and regulating the spleen and stomach functions. In addition, the contraction and relaxation of the abdominal cavity can promote gastric movement and digestion, and invigorate the spleen and stomach.



Movement: Retract hands.

Breathing: Inhale through the nose.



Movement: Bend knees slightly, opening hands until arms are rounded.

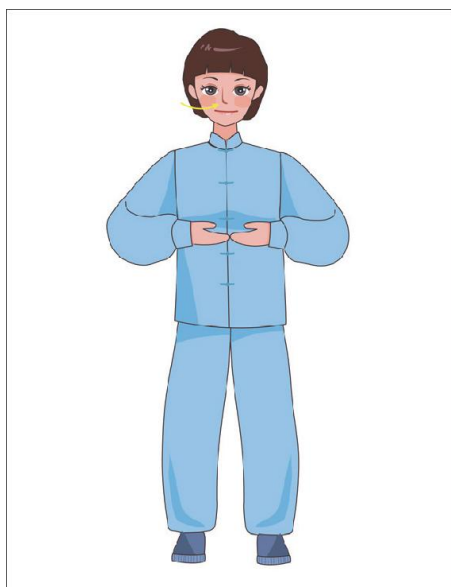
Breathing: Exhale through pursed lips.

Sound: Pronounce “HU” slowly.

THIRD: “SI” ZIJUE

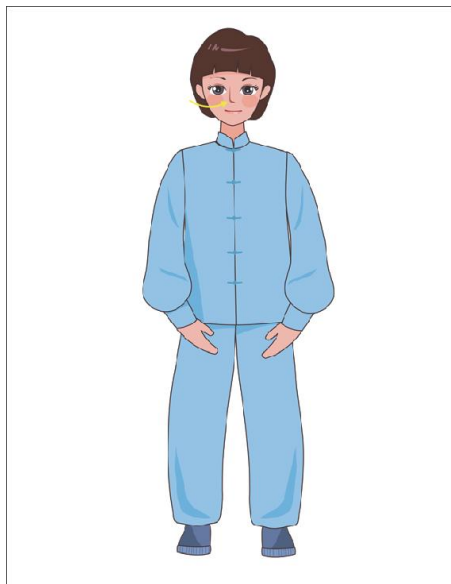
Movement instruction: Continue with previous movement. Straighten the knees slowly, drop palms naturally with palms facing upward, fingertips pointing toward each other. Then, raise palms slowly to chest level and inhale through the nose. Drop elbows and face the two palms toward each other, extending shoulder and expanding chest, head up and neck down, exhaling slowly and inhaling through the nose (one breath cycle). Bend knees slightly, exhale through pursed lips, and pronounce “SI,” simultaneously loosening shoulders and extending neck, pushing hands forward slowly with the palms facing forward. Then, rotate wrists to turn palms facing inward, retract hands to about four inches in front of chest, straighten knees slowly, and inhale through the nose. Take a break, then repeat the exercise six times.

Effects: Traditional Chinese medicine claims that the “SI” sound corresponds to the lung. Hence, pronouncing “SI” has the effect of releasing turbid gas and regulating lung functions. In addition, the movements of the shoulder, chest, head, and neck can fully spread the innate Qi in the chest, and the contracted abdomen can lift the Qi from the three inches under the navel to the chest. The combination of innate and acquired Qi in the chest can improve the function of the lung and promote gas transport and exchange.²



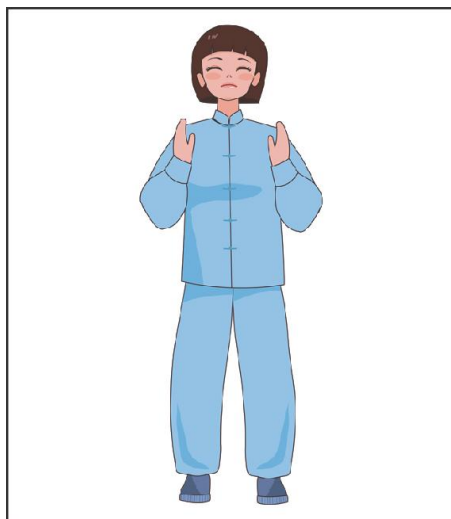
Movement: Drop hands and straighten knees.

Breathing: Inhale through the nose and exhale slowly.



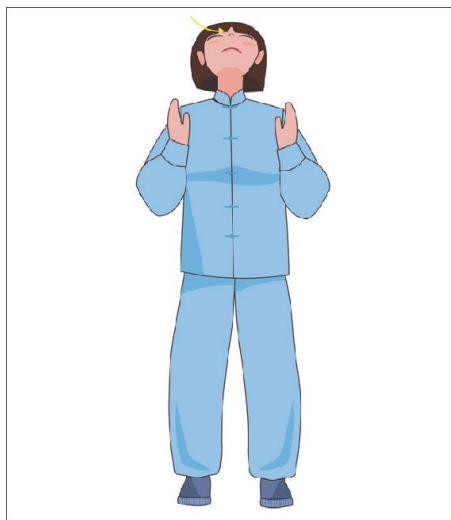
Movement: Raise palms slowly to chest level.

Breathing: Inhale through the nose.



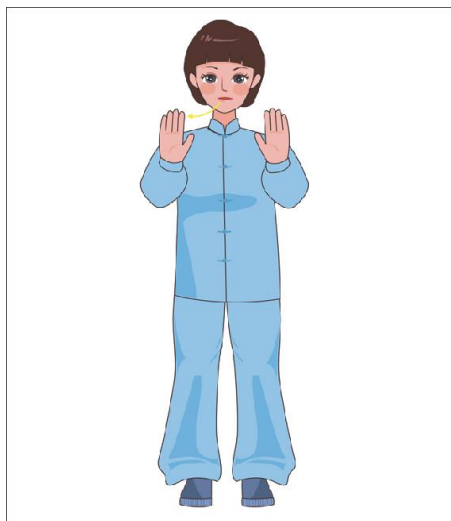
Movement: Drop palms naturally with palms facing toward each other.

Breathing: Exhale slowly.



Movement: Extend shoulder and expand chest, head up and neck down.

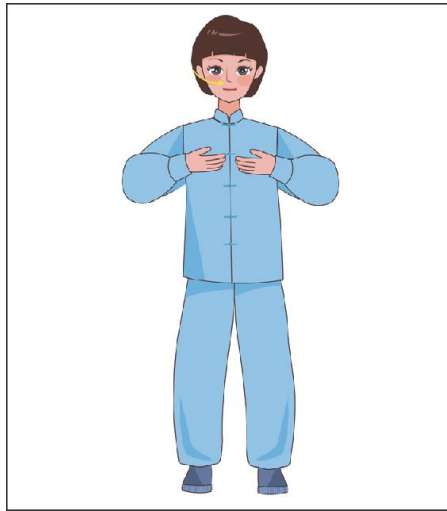
Breathing: Inhale through the nose.



Movement: Bend knees, pushing hands forward slowly with the palms facing forward.

Breathing: Exhale through pursed lips.

Sound: Pronounce “SI” slowly.



Movement: Retract hands and straighten knees.

Breathing: Inhale through the nose.

FOURTH: “PUSHING UP THE SKY” TO REGULATE INTERNAL ORGANS

Movement instruction: Continue with previous movement. Drop palms naturally with palms facing upward, fingertips pointing toward each other. Cross hands in front of the abdomen with palms facing upward and breathe naturally. Raise hands to chest level and inhale through the nose. Then turn the forearms to make palms face upward and gaze at hands. Raise hands until the elbows are straight, looking ahead (two breath cycles). Bend knees and drop arms on both sides of the body, exhale through pursed lips. Take a break and then repeat the exercise six times.

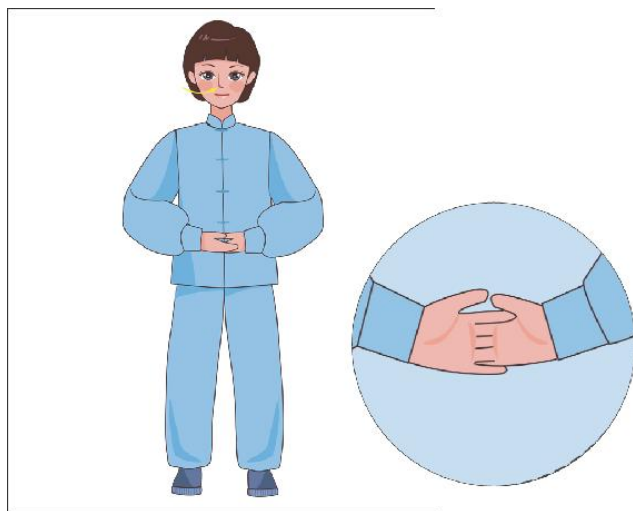
Effects: The movement of raising crossed hands can stretch the body, which regulates the “triple warmer,” Qi, and blood. The triple warmer comprises the internal organs of the body. The upper warmer comprises the heart and lung, the medium warmer comprises the spleen and stomach, and the lower warmer comprises the other organs. Hence, the movement can strengthen the heart, lung,

stomach, spleen, liver, and gallbladder and improve the physical condition.



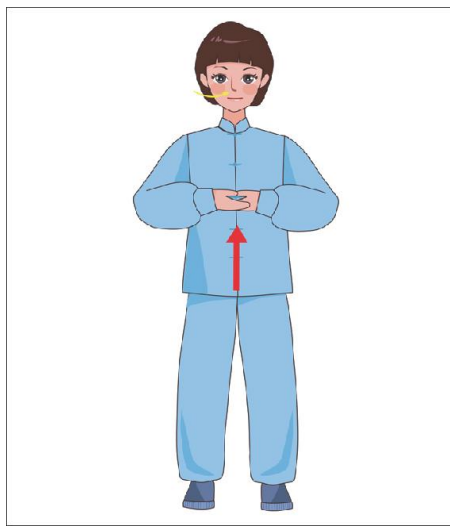
Movement: Drop hands and straighten knees.

Breathing: Inhale through the nose and exhale slowly.



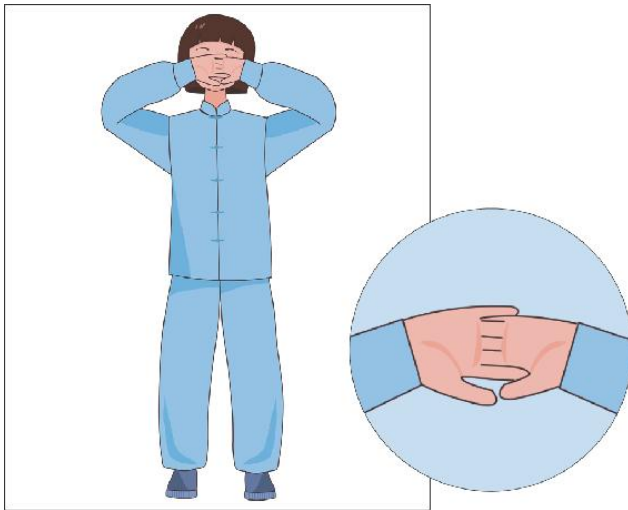
Movement: Cross hands in front of the abdomen.

Breathing: Inhale through the nose.



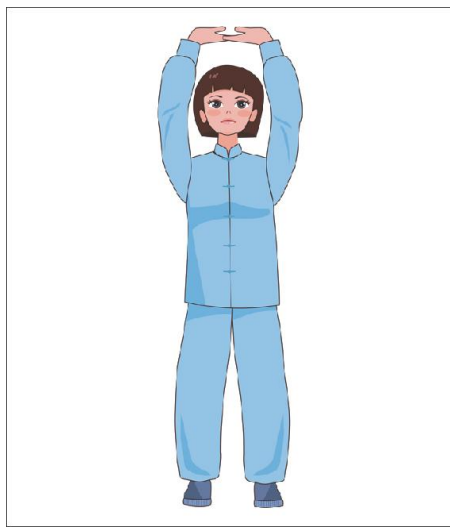
Movement: Raise up hands to the level of the chest.

Breathing: Inhale through the nose.



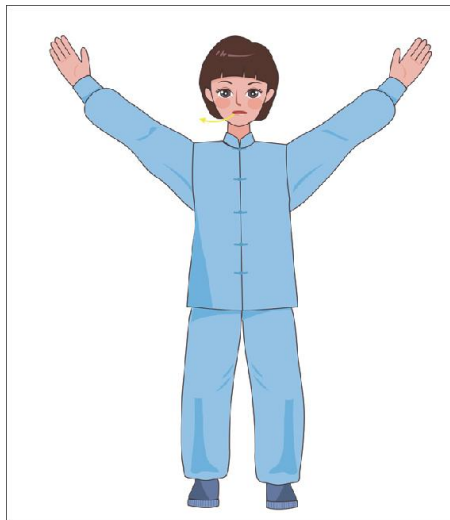
Movement: Turn the forearms to make palms face upward at the chest level, gazing at hands.

Breathing: Inhale through the nose.



Movement: Raise up hands until the elbows are straight, gazing at hands, stretching the spine.

Breathing: Inhale through the nose.



Movement: Drop arms on both sides of the body, bending knees slightly.

Breathing: Exhale through pursed lips.

FIFTH: DRAWING A BOW TO SHOOT A VULTURE

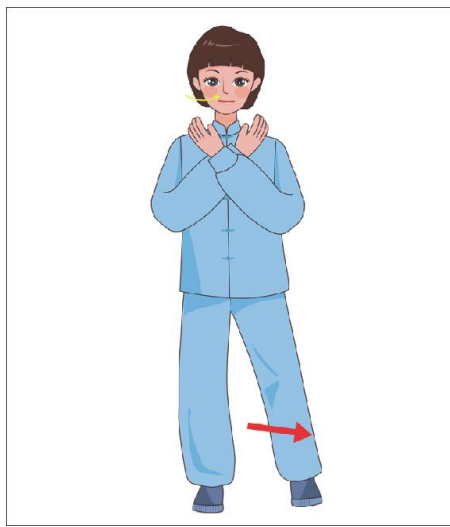
Movement instruction: Continue with previous movement. Shift center of gravity right and step left foot to the left. Cross hands in front of the chest with the left hand outside and look ahead, inhaling through the nose. Extend left arm to the left with “Ba”(ㄅ) palm (all fingers tucked in except the index finger, which should point straight up), gazing at the left fingertips, flexing right arm with the right fist in front of the right side of chest, and bending knees to squat, exhaling through pursed lips. Shift center of gravity right, extending right arm to the right, inhaling through the nose, dropping arms on both sides of the body, bringing left foot back to center. The right action is opposite to the left but similar. One left and one right for one time, and repeat the exercises three times.

Effects: The movement of shoulder extension and chest expansion can activate muscles in the back and promote the circulation of Qi and blood in the back. The movement of pulling the bowstring with the fingers and extending “Ba” (ㄅ) palm can activate the muscles in the arm and promote the circulation of Qi and blood in the arm, which is beneficial for the heart, lungs, and triple warmer, according to Traditional Chinese Medicine.³



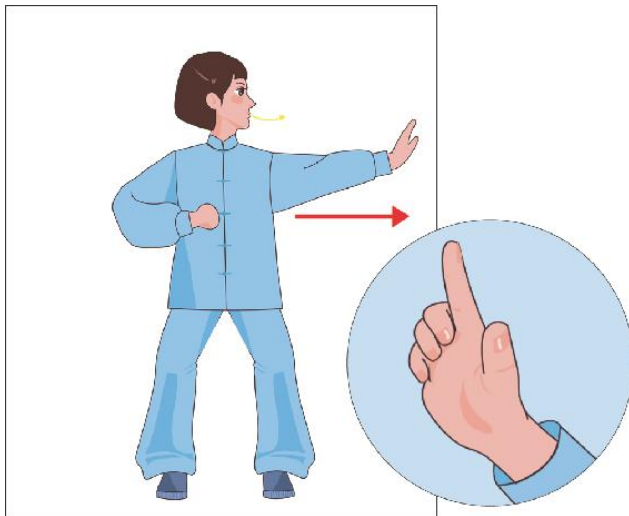
Movement: Drop hands and straighten knees.

Breathing: Inhale through the nose.



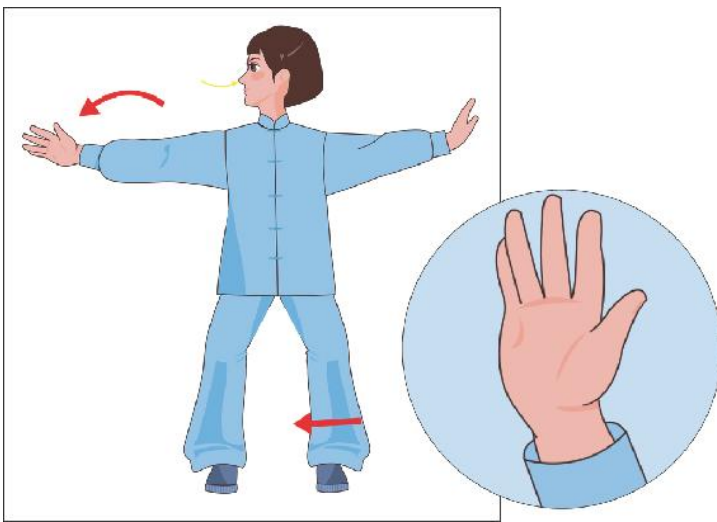
Movement: Cross hands in front of chest with the left hand outside, stepping left foot to left, bending knees slightly.

Breathing: Inhale through the nose.



Movement: Extend left arm to the left with “Ba” (ㄅ) palm, bending knees to squat.

Breathing: Exhale through pursed lips.

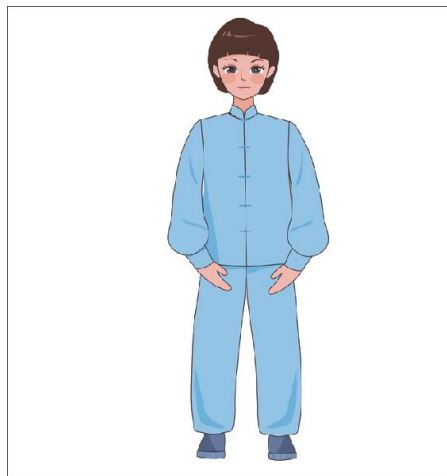


Movement: Extend right arm to the right, dropping arms on both sides of the body and bringing back left foot.

Breathing: Inhale through the nose.

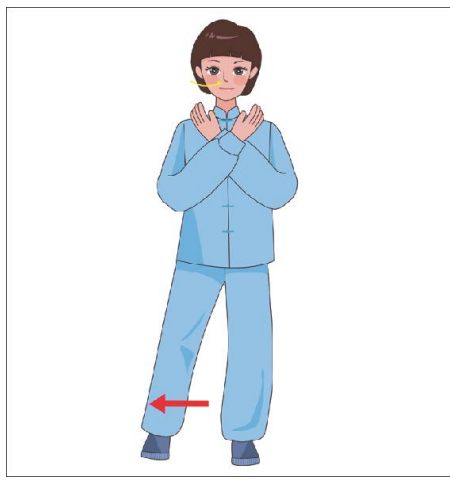
Movement: Extend right arm to the right, dropping arms on both sides of the body and bringing back left foot.

Breathing: Inhale through the nose.



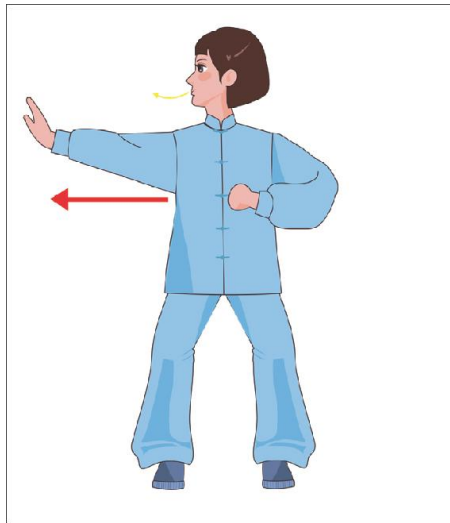
Movement: Drop hands and straighten knees.

Breathing: Inhale through the nose and exhale slowly.



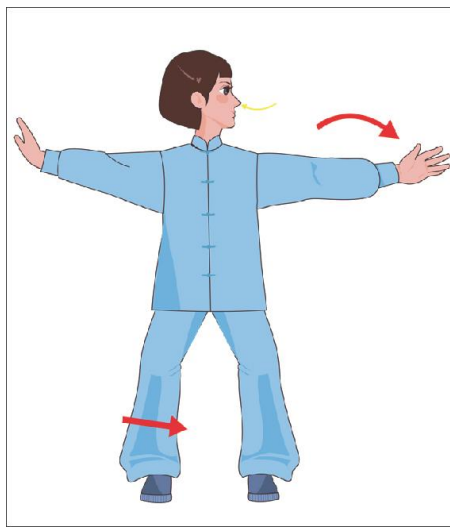
Movement: Cross hands in front of the chest with the right hand outside, stepping right with right foot, bending knees slightly.

Breathing: Inhale through the nose.



Movement: Extend right arm to the right with “Ba” (ㄨ) palm, bending knees to squat.

Breathing: Exhale through pursed lips.



Movement: Extend left arm to the left, dropping arms on both sides of the body, bringing back right foot.

Breathing: Inhale through the nose.

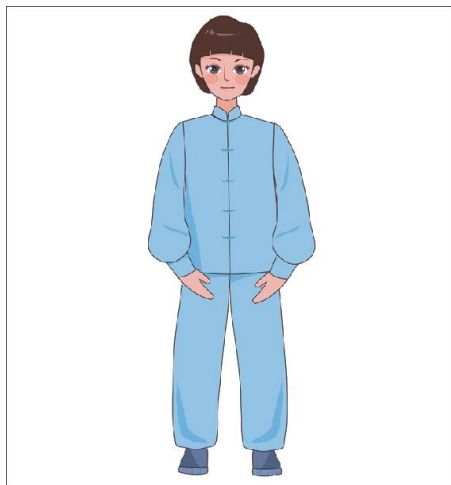
SIXTH: THE CRANE EXERCISE (INCLUDING THE CRANE EXTENSION AND THE CRANE FLY)

Movement instruction: Continue with previous movement. Drop palms naturally with palms facing upward and fingertips pointing toward each other; place feet shoulder-width apart. Cross hands in front of the abdomen, raise the crossed hands slowly up to the head along the centerline. At the same time, shrug, neck down, and backside up, inhaling through the nose. Drop the crossed hands slowly along the centerline, separate hands in front of the abdomen and stretch arms back along the sides of the body, stretching left leg back with right leg straight, exhaling through pursed lips.

Cross hands in front of the abdomen, raise the crossed hands slowly up to the head along the centerline, drop the crossed hands slowly along the centerline, separating hands in front of the abdomen, and stretching arms back behind the sides of the body, stretching right leg back with left leg straight. One left and one right for one time, and repeat the exercises three times.

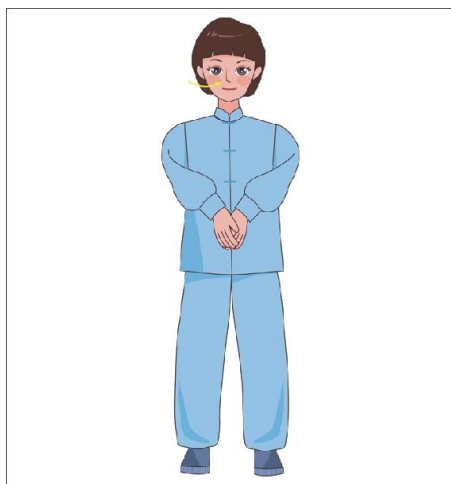
Effects: Inhaling with raised hands can expand the chest cavity,

and exhaling while pushing hands downward can expel turbid gas. Therefore, this exercise can enhance the lung function, increase lung vital capacity, and improve the symptoms of chronic bronchitis and chronic obstructive pulmonary disease. Raising the hands can activate the muscles in the back and promote the circulation of Qi and blood in the back. Swinging the arms back to the sides of the body can activate the muscles in the chest and abdomen and promote the circulation of Qi and blood. Hence, the exercise can enhance the movement of Qi and blood in the human body.



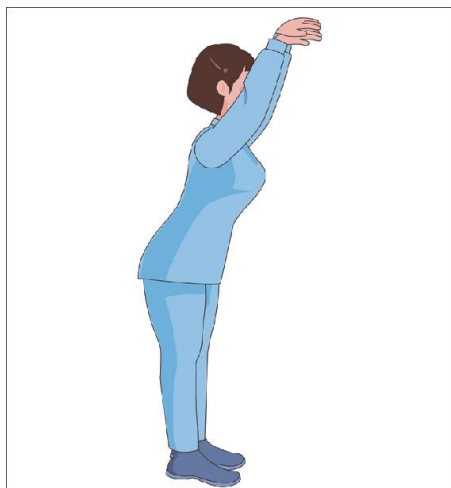
Movement: Drop hands and straighten knees.

Breathing: Inhale through the nose and exhale slowly.



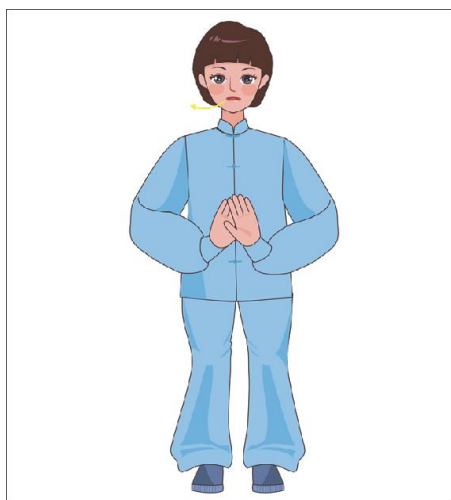
Movement: Cross hands in front of the abdomen.

Breathing: Inhale through the nose.



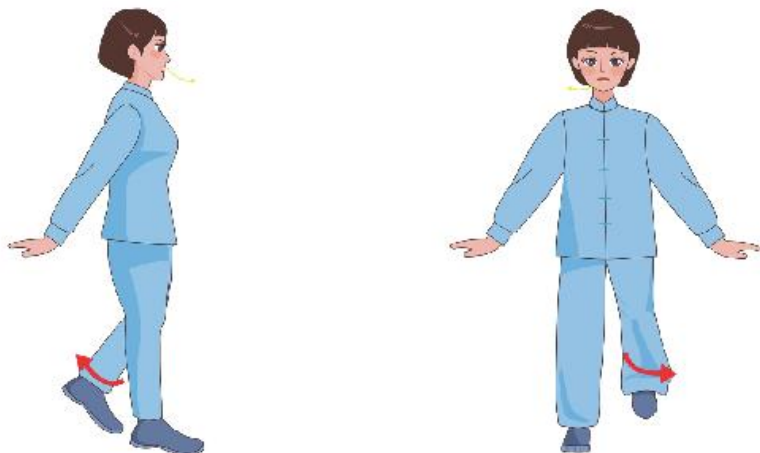
Movement: Raise the crossed hands slowly up to the head along the centerline.

Breathing: Inhale through the nose.



Movement: Drop the crossed hands slowly along the center-line, bending knees slowly.

Breathing: Exhale through pursed lips.



Movement: Separate hands in front of the abdomen and stretch arms back along the sides of the body, stretching left leg back with right leg straight.

Breathing: Exhale through pursed lips.

The Cranefly

Movement instruction: Continue with previous movement. Hold hands in front of the abdomen with palms facing upward. Move arms on both sides of body to the shoulder level like a crane (the bird), raising the left knee with right leg straight, inhaling through the nose. Drop arms on both sides of the body, dropping the left knee, exhaling through pursed lips. Move arms on both sides of the body up to the head, raising the left knee with right leg straight, inhaling through the nose. Drop arms on both sides of the body, dropping the left knee, exhaling through pursed lips (when dropping the arms and left knee, the right leg bends slightly; after the left toe touches the ground, raise left knee). Switch sides and repeat. One left and one right for one time, and repeat the exercises three times.

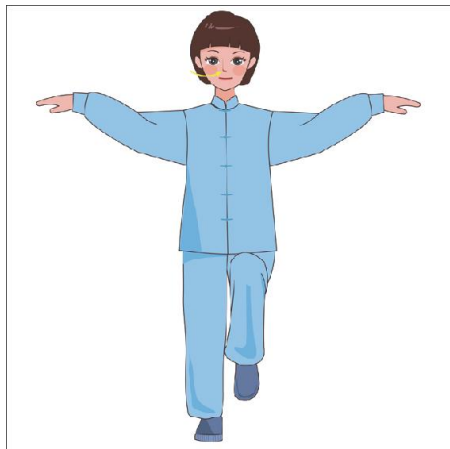
Effects: Up-and-down movements of the upper limbs can change the volume of the chest cavity. These movements, combined with breathing exercises, can massage the heart and lungs and enhance

the capacity of the blood oxygen exchange.⁴



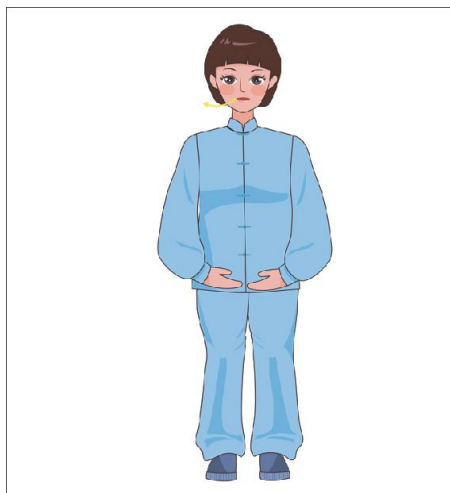
Movement: Drop hands and straighten knees.

Breathing: Inhale through the nose and exhale slowly.



Movement: Move arms on both sides of the body to the shoulder level, raising left knee with right leg straight.

Breathing: Inhale through the nose.



Movement: Drop arms on both sides of the body, bending knees slightly.

Breathing: Exhale through pursed lips.



Movement: Move arms on both sides of the body up to the head, raising left knee with right leg straight.

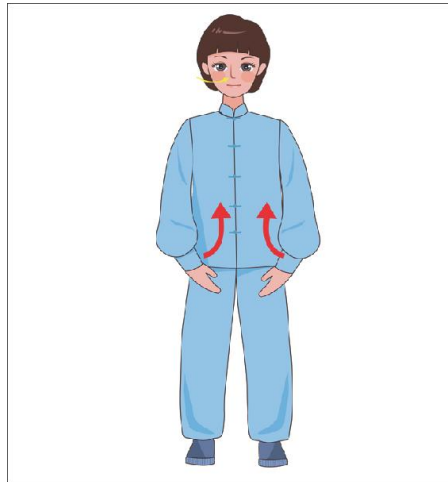
Breathing: Inhale through the nose.

SEVENTH: CROSS-ARMED IRON STAFF

Movement instruction: Continue with previous movement. Hold

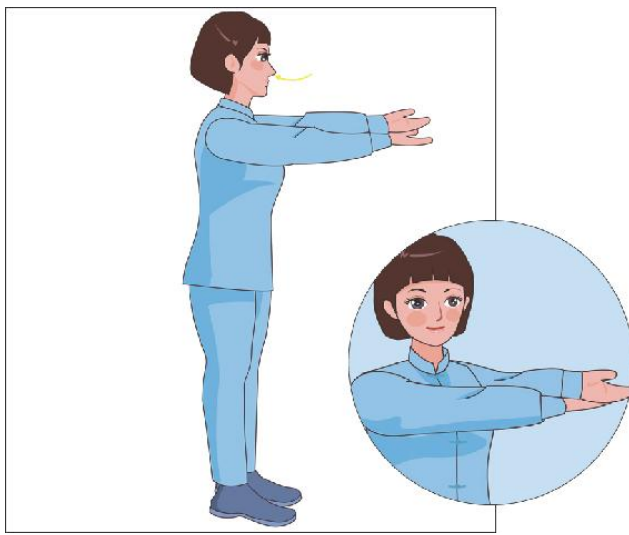
hands in front of the abdomen with palms facing upward. Raise arms to shoulder height and then cross arms in front of chest. Move arms apart to the sides of the body with palms facing upward, inhaling through the nose. Turn palms to face downward, stand on toes (a calf raise), look forward, and exhale slowly. Maintain this posture for ten to twenty seconds; breathe naturally. Drop palms in front of the body with palms facing upward and drop heels on the ground.

Effects: By lifting both arms horizontally and supporting the body with the front of the foot, the force can reach the peripheral limbs. This movement can not only activate the circulation of Qi, but also promote the transport of Qi and blood in the body.⁵



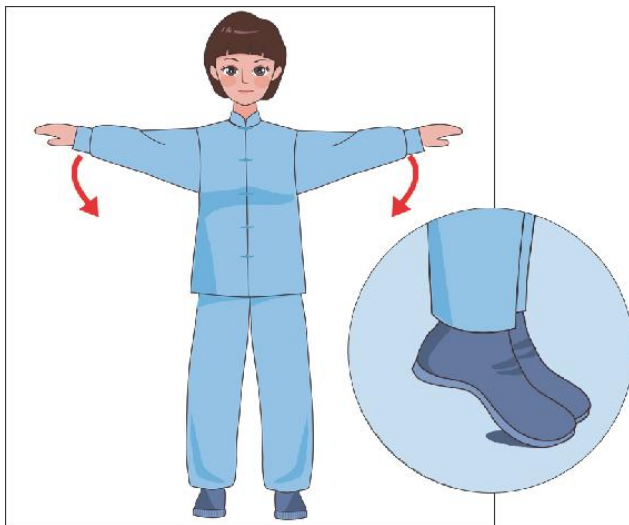
Movement: Drop hands and straighten knees.

Breathing: Inhale through the nose.



Movement: Cross arms in front of the chest at shoulder height, moving arms on both sides of the body with palms facing upward.

Breathing: Inhale through the nose.



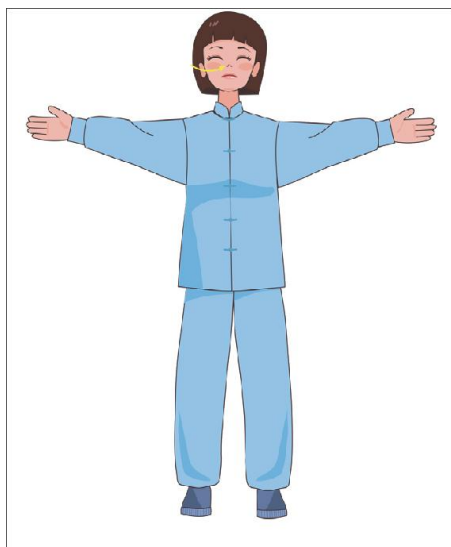
Movement: Move arms on both sides of the body to shoulder height, standing on toes.

Breathing: Inhale through the nose and exhale slowly.

EIGHTH: RESTORE POSITION

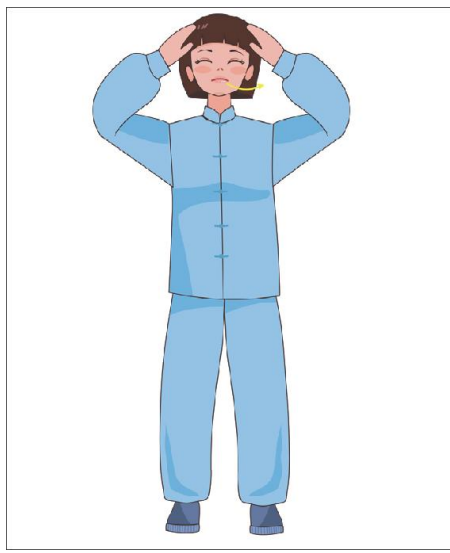
Movement instruction: Stand naturally, with feet shoulder-width apart. Raise arms to shoulder height on both sides of the body with palms facing outward, while inhaling. Drop arms in front of the body while exhaling. Coordinate movements with the mind. Then, cross hands in front of the abdomen, press and rub the abdomen six times. Close eyes and regulate breath.

Effects: Calm down.



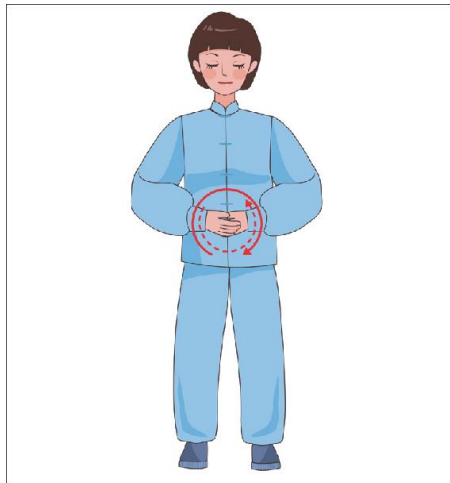
Movement: Raise arms on both sides of the body.

Breathing: Inhale through the nose.



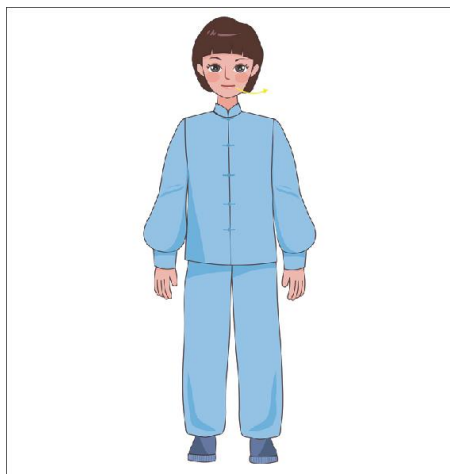
Movement: Drop arms in front of the body; repeat the exercises three times.

Breathing: Exhale slowly.



Movement: Press and rub the abdomen, three times clockwise and three times counterclockwise.

Breathing: Inhale through the nose and exhale slowly.



Movement: Drop hands and stand naturally.

Breathing: Inhale through the nose and exhale slowly.

1 Liu XD, Li PJ, Zhen WW, et al. "Evaluation of isokinetic muscle strength of upper limb and the relationship with pulmonary function and respiratory muscle strength in stable COPD patients [J]." *International Journal of Chronic Obstructive Pulmonary Disease*, 2019, 14(12): 2027–2036.

Liu XD, Li PJ, Xiao L, et al. "Effects of home-based prescribed pulmonary exercise by patients with chronic obstructive pulmonary disease: study protocol for a randomized controlled trial [J]." *Trials*, 2019, 20(41): 1–12.

Liu XD, Li PJ, Li J, et al. "Effects of home-based prescribed pulmonary exercise in patients with stable chronic obstructive pulmonary disease [J/OL]," 2019, 8: 18. <https://www.jove.com/video/59765>.

2 Health Qigong Administration Center of General Administration of Sport of China. *Health Qigong Liuzijue*. Beijing: People's Sport Press, 2003.

3 Health Qigong Administration Center of General Administration of Sport of China. *Health Qigong Baduanjin*. Beijing: People's Sport Press, 2003.

4 Health Qigong Administration Center of General Administration of Sport of China. *Health Qigong Wuqinxi*. Beijing: People's Sport Press, 2003.

5 Health Qigong Administration Center of General Administration of Sport of China. *Health Qigong Yijinjing*. Beijing: People's Sport Press, 2003.

Part 3: Bed-Based Rehabilitation Training Program for Patients with Severe COVID-19 Symptoms during Recovery

This training program includes breath training and limb training. It integrates modern exercise therapy and traditional Chinese Qigong exercise (Liuzijue), which can be used to improve pulmonary function, decrease respiratory resistance, enhance respiratory muscle strength, and promote functional recovery of patients with severe COVID-19 symptoms in a stable condition.

1 Objective

Gradual rehabilitation training in bed for severe COVID-19 convalescent patients in a stable condition can reduce the possible complications caused by prolonged bed rest, improve patients' cardiopulmonary function and physical and mental condition, and promote recovery and a better prognosis.

2 Principles

Safety first: The first training session should be supervised by medical staff, and attention should be paid to patients' subjective feelings (fatigue) during and after training, as well as their heart rate, blood pressure, blood oxygen saturation, and other indexes.

Breathe naturally: Breathe naturally during training; do not breathe hesitantly or hold the breath.

Step by step: The amplitude, frequency, and timing of breathing and physical activity can be gradually increased step by step according to individual needs.

Timely termination: If there is any discomfort (such as cough, chest tightness, headache, dizziness, or joint pain), training should be terminated promptly.

Personalized training: Tailor the training according to each patient's condition.

3 Protocols

This training program combines breathing training and limb movements and integrates modern exercise therapy and traditional Chinese Qigong exercise (Liuzijue). Each training program takes about twenty minutes, and a training frequency of once or twice a day is recommended, according to the patient's condition.

3.1 Pulmonary Rehabilitation Training in Supine Position

FIRST GROUP: BREATHING TRAINING

Training objective: Enhance respiratory muscle strength, improve lung ventilation, and reduce dyspnea. Peaceful breathing.

Movement instruction: Maintain a supine or semisupine position and relax the whole body. Focus on breathing. Inhale through the nose and exhale through pursed lips slowly (as if playing a flute). Place one hand on the chest and the other on the abdomen to feel the up-and-down motions of the chest and abdomen when breathing. Adjust the time ratio of inhalations to exhalations to 1:2 (e.g., inhale for two seconds and exhale for four seconds). General requirements for breathing exercises: slowly, evenly, and deeply; six times per session, for a total of one session. Rest for fifteen seconds after one session is completed.



Movement: Relaxing the whole body, place one hand on the chest and

the other on the abdomen to feel the breathing process.

Breathing: Inhale through the nose.

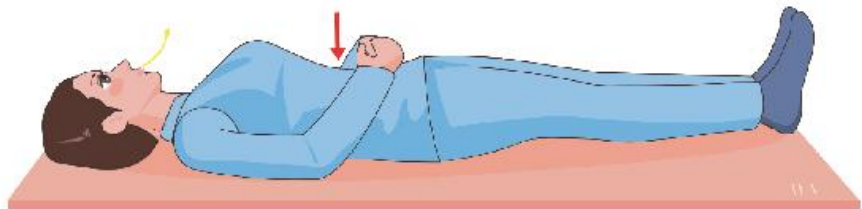


Movement: Relax the whole body; place one hand on the chest and the other on the abdomen to feel the breathing process.

Breathing: Exhale through pursed lips.

Abdominal Breathing

Movement instruction: Maintain a supine or semisupine position and relax the whole body. Cross fingers with palms facing down and place them above the navel to feel the up-and-down movement of the abdomen when breathing. Inhale slowly through the nose and make the abdomen bulge with the inhalation, but keep the shoulders and thorax relaxed; exhale slowly through the mouth (with pursed lips and small mouth), so that the abdomen sinks. The time ratio of inhalations to exhalations is 1:2 (for example, inhale for two to three seconds, then exhale for four to six seconds). One inhalation and one exhalation counts as one time, six times as one session, for a total of one session. Rest for fifteen seconds after one session is completed.



Movement: Cross fingers with palms facing down and place them above the navel, keep the shoulders and thorax relaxed; bulge the abdomen.

Breathing: Inhale through the nose.



Movement: Cross fingers with palms facing down and place them above the navel; sink the abdomen.

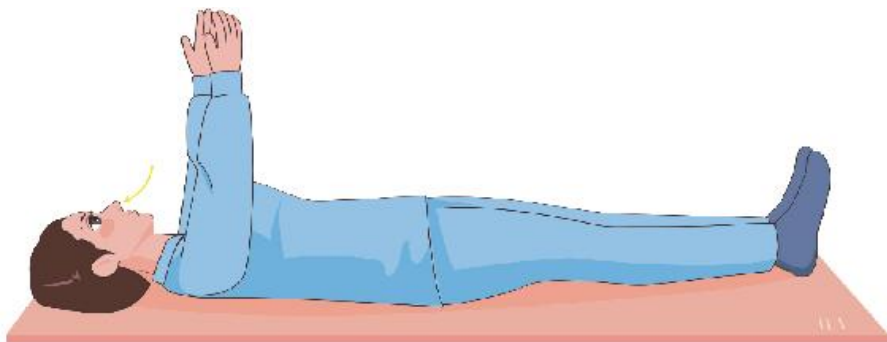
Breathing: Exhale slowly through pursed lips.

SECOND GROUP: UPPER LIMBS ACTIVE EXERCISES

Training objective: Maintain the range of motion of the upper limb and shoulder and promote the activity of thorax-related muscles.

Upper limbs front raise

Movement instruction: Maintain a supine or semisupine position and relax the whole body. Raise arms slowly straight up to shoulder level, inhale through the nose, and then drop arms slowly, exhaling through pursed lips. One raise and one drop counts as one time, six times as one session, for a total of one session. Rest for fifteen seconds after one session is completed.



Movement: Raise arms with palms facing each other.

Breathing: Inhale through the nose.



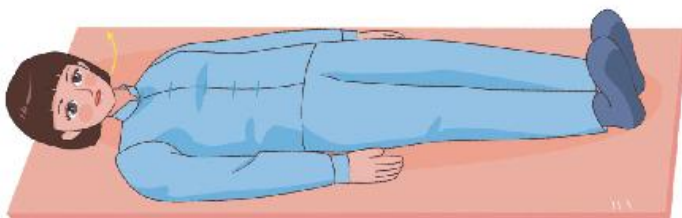
Movement: Drop arms on both sides of the body.

Breathing: Exhale through pursed lips.

Upper limbs lateral raise

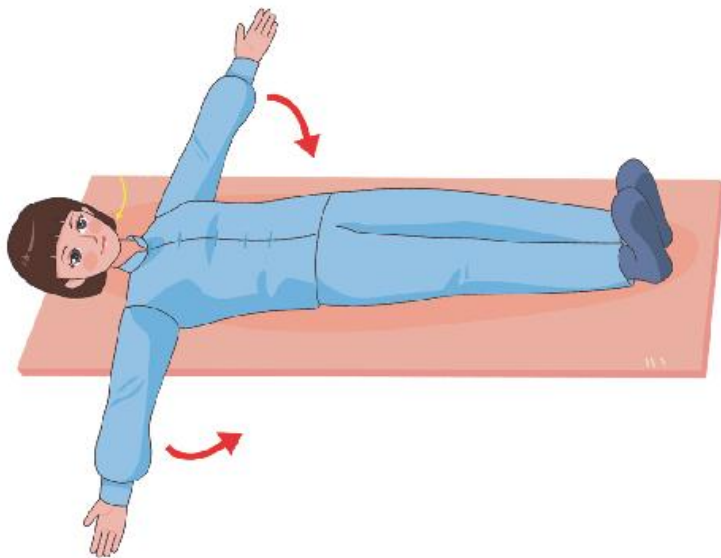
Movement instruction: Maintain a supine or semi-supine position and relax the whole body. Raise arms on both sides of the body to shoulder level while keeping them against the bed or mat, inhale through the nose, then retract arms slowly to both sides of the body, exhaling through pursed lips. One raise and one retraction counts as one time, six times as one session, for a total of one session. Rest for fifteen seconds after one session is completed.

35



Movement: Raise arms on both sides of the body with palms facing upward.

Breathing: Inhale through the nose.



Movement: Retract arms with palms facing upward.

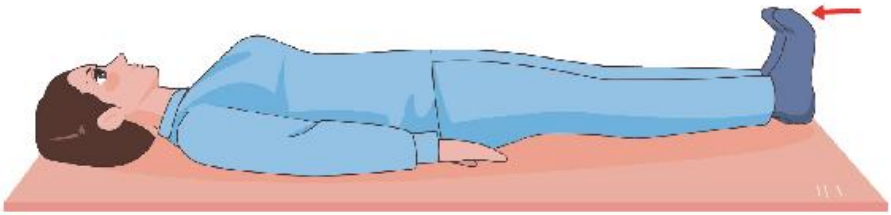
Breathing: Exhale slowly through pursed lips.

THIRD GROUP: LOWER LIMBS ACTIVE EXERCISES

Training objective: To maintain the range of motion of the lower limb and hip joint, promote blood circulation in the lower limbs, and prevent venous thrombosis.

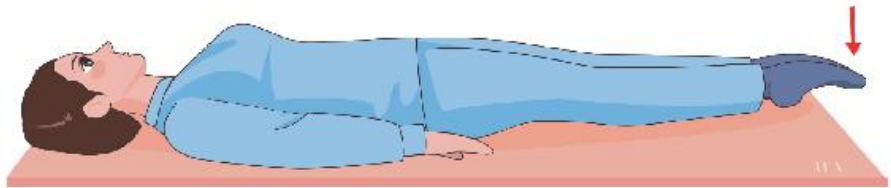
Ankle pump exercise

Movement instruction: Maintain a supine or semisupine position and relax the whole body. Bend toes slowly toward the rest of your body to the maximum extent, hold for five to ten seconds. Then, slowly press the toes away from the rest of your body in a downward motion to the maximum extent, hold for five to ten seconds, then relax. One bend up and one press down counts as one time, six times as one session, for a total of one session. Rest for fifteen seconds after one session is completed.



Movement: Bend toes slowly to the maximum extent with knees straight.

Breathing: Peaceful breathing or abdominal breathing.



Movement: Press toes down slowly to the maximum extent with knees straight.

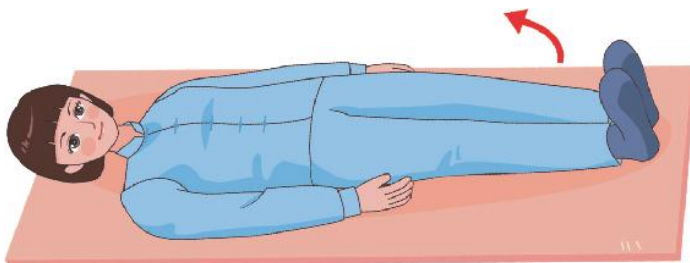
Breathing: Peaceful breathing or abdominal breathing.

Straight leg raising with free load

Movement instruction: Maintain a supine or semisupine position and relax the whole body. Raise the knee and ankle as far as possible with quadriceps (front of your thigh) tight, hold for five to ten seconds at the highest point, and then drop the leg slowly. Repeat the same action with the other leg. One left and one right counts as one time, six times as one session, for a total of one session. Rest for fifteen seconds after one session is completed.

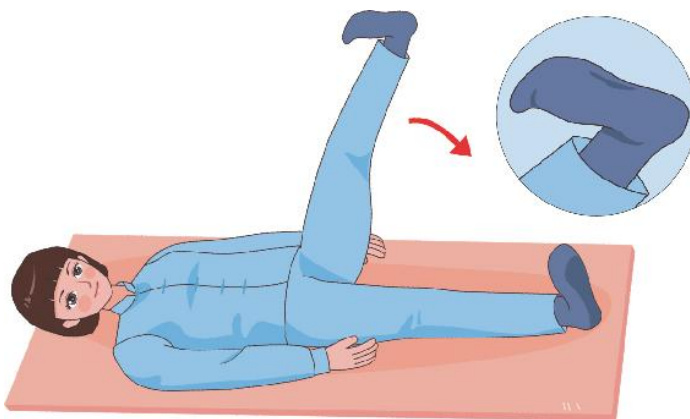
Movement: Extend the knees and ankles as far as possible while remaining flat on the mat. Then raise left leg.

Breathing: Peaceful breathing or abdominal breathing.



Movement: Drop left leg and repeat the same action with the right leg.

Breathing: Peaceful breathing or abdominal breathing.



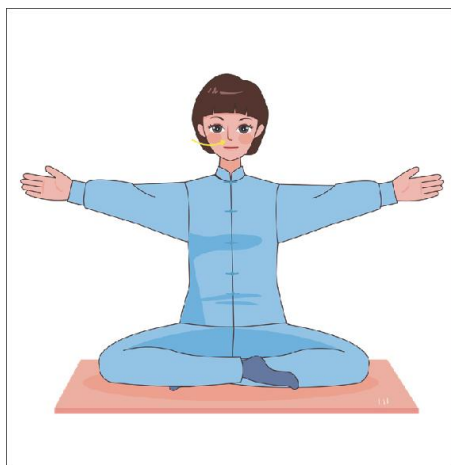
3.2 Pulmonary Rehabilitation Training in Sitting Position

FIRST GROUP: UPPER LIMBS ACTIVE EXERCISES

Training objective: To maintain the range of motion of the upper limb and shoulder joint and promote the activity of thorax-related muscles.

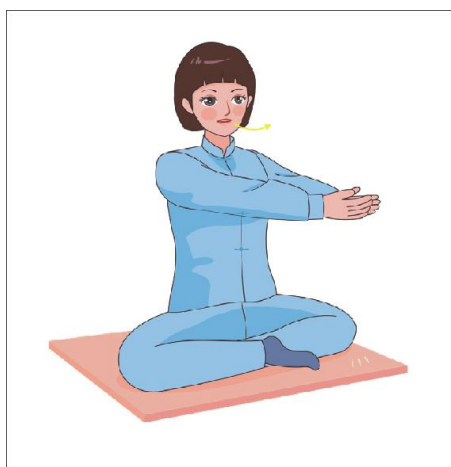
Straight arm clapping

Movement instruction: Stay in a relaxed sitting or semisupine position. Raise arms in front of the body to shoulder level, then horizontally move arms to both sides slowly, inhaling through the nose. Then horizontally move arms slowly until hands are clapping, exhaling slowly through pursed lips. One full clap counts as one time, six times as one session, for a total of one session. Rest for fifteen seconds after one session is completed.



Movement: Horizontally move arms with chest expanded.

Breathing: Inhale through the nose.

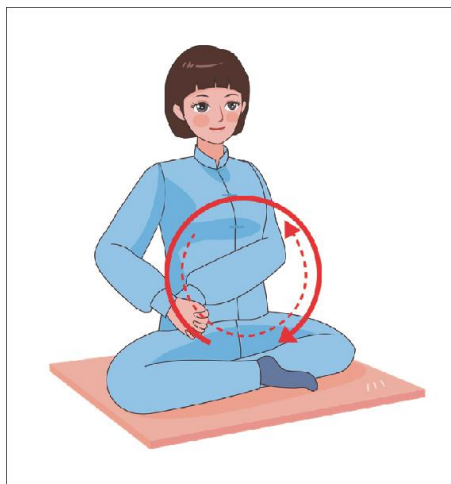


Movement: Horizontally move arms until hands are clapping.

Breathing: Exhale through pursed lips.

Circle with crossed arms

Movement instruction: Stay in a relaxed sitting or semisupine position. Raise arms in front of the body and lace fingers together, with palms pressed together, then circle clockwise and counter-clockwise alternately in front of your body. Circling once clockwise and once counterclockwise counts as one time, six times as one session, for a total of one session. Rest for fifteen seconds after one session is completed.



Movement: Raise arms in front of the body and lace fingers together.

Breathing: Peaceful breathing or abdominal breathing.



Movement: Circle clockwise and counterclockwise alternately with laced fingers.

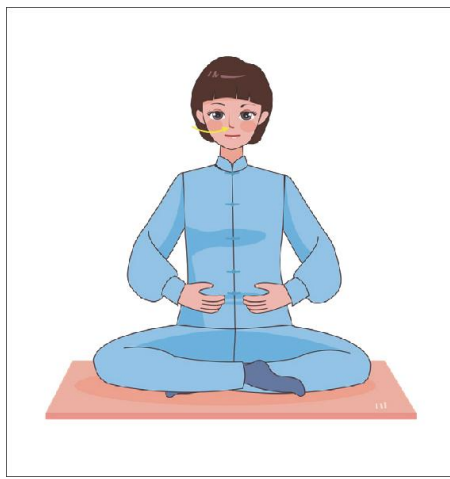
Breathing: Peaceful breathing or abdominal breathing.

SECOND GROUP: “HU” AND “SI” ZIJUE OF LIUZIJUE

Training objective: To improve respiratory function and alleviate anxiety.

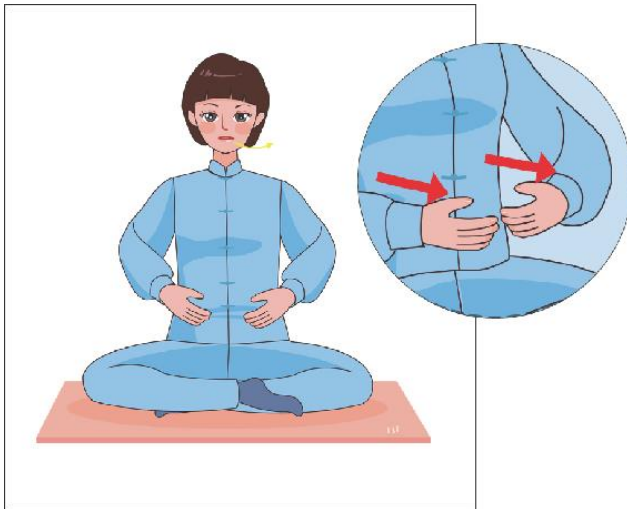
“Hu” zijue

Movement instruction: Stay in a relaxed sitting or supine position. Place hands in front of the abdomen and face palms inward, opening hands with fingertips pointing toward each other, inhaling through the nose. Then, move hands away from your body until arms are rounded and exhale while pronouncing “HU” for five to eight seconds. One inhalation and one exhalation counts as one time, six times as one session, for a total of one session. Rest for fifteen seconds after one session is completed.



Movement: Place hands in front of the abdomen, opening hands with fingertips pointing toward each other.

Breathing: Inhale through the nose.

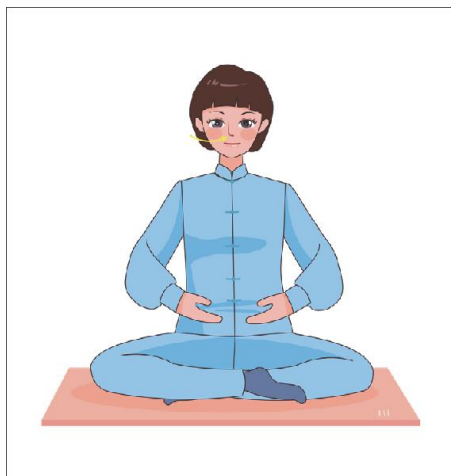


Movement: Move hands away from body until arms are rounded.

Breathing: Exhale through pursed lips.

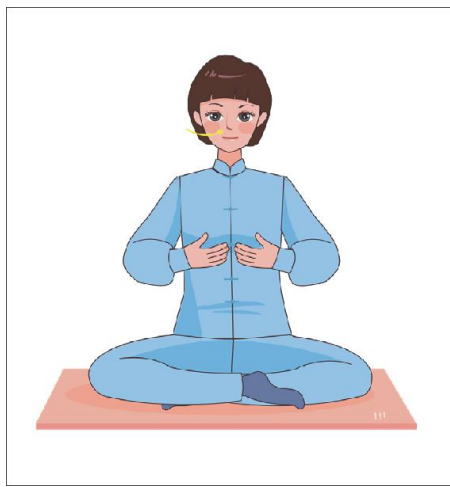
Sound: Pronounce “HU” slowly.

Movement instruction: Place hands in front of the abdomen and face palms inward, opening hands with the fingertips pointing toward each other. Then, raise palms slowly to the chest level and inhale through the nose. Drop elbows and face the two palms, extending the shoulder and expanding the chest, head up and neck down, looking forward. Push hands forward slowly with the palms facing outward, exhaling through pursed lips and pronouncing “SI” for five to eight seconds. Then inhale, rotate wrists to turn palms facing inward, and retract hands to chest slowly; six times counts as one session, for a total of one session. Rest for fifteen seconds after one session is completed.



Movement: Place hands in front of the abdomen, opening hands with the fingertips pointing toward each other.

Breathing: Inhale through the nose and exhale slowly.



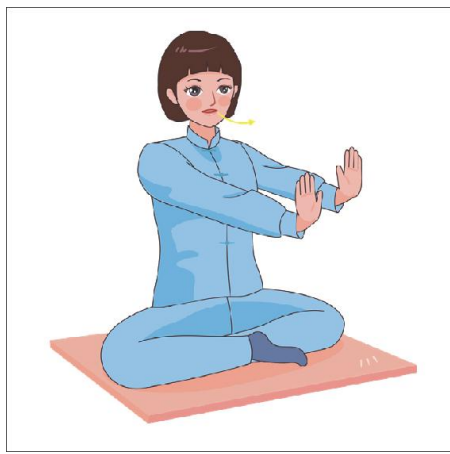
Movement: Raise palms slowly to the chest level.

Breathing: Inhale through the nose.



Movement: Drop elbows and face the two palms, extending the shoulders and expanding the chest, head up and neck down.

Breathing: Inhale through the nose.



Movement: Push hands forward slowly with the palms facing outward, and looking forward.

Breathing: Exhale through pursed lips.

Sound: Pronounce “SI” slowly.